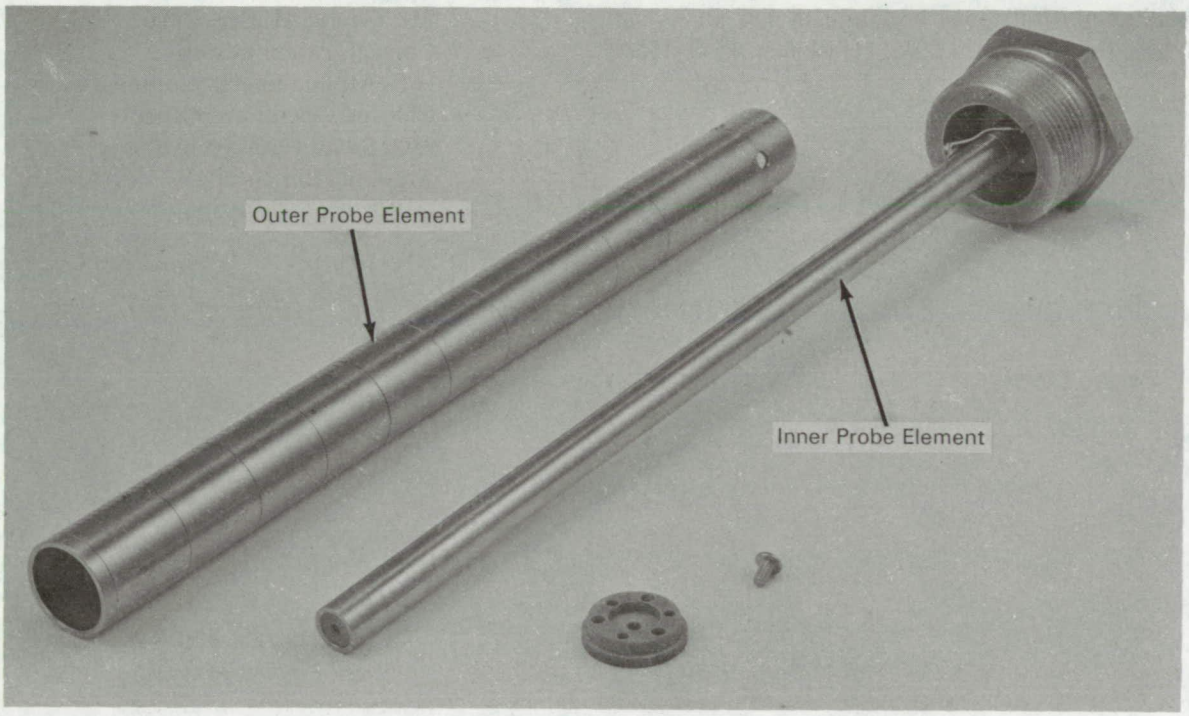
AEC-NASA TECH BRIEF

Cryogenic Liquid Level Measuring Probe



The problem:

To design a probe to measure the static and dynamic levels of cryogenic liquids in a hydrogen bubble chamber. The sensitive volume, pressure, and density of the liquid are dependent on the liquid height. The probe must be able to perform at −246°C with a short response time.

The solution:

A universal liquid level measuring probe, with a unique frequency discriminator, which provides continuous readings on the levels of nitrogen, hydrogen, or helium to an accuracy of ±1%. The probe has a dynamic response time of less than 150 μsec. allowing boiling conditions or other turbulence to be observed throughout all the transition stages.

How it's done:

The coaxial probe, immersed in the liquid, measures the difference in the dielectric constants between the liquid and gas phases of the media. The probe capacity is therefore a function of the height of the liquid within the probe elements. The probe and its associated cable constitute the capacity in the tuned circuit of an oscillator and a change in the liquid level is reflected as an oscillator frequency change.

(continued overleaf)

A unique feature of the probe is its frequency discriminator. A voltage controlled oscillator is phase-locked to the probe oscillator frequency. The error voltage required to tune the voltage controlled oscillator to the probe oscillator is then a function of the liquid level.

A percentage readout is used with the probe to provide a more efficient use of the instrument's dynamic range and to reduce operator error. In addition, the system may be used in a data logger to record liquid levels in a number of containers through a scanning operation.

Notes:

1. Results are available for a number of test measurements made with N_2 and He^4.
2. Additional details may be found in *The Review of Scient. Instrms.*, vol. 37, no. 11, 1966, p. 1549–1554.
3. Inquiries concerning this innovation may be directed to:

   Office of Industrial Cooperation
   Argonne National Laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B68-10291

Source: J. A. Dinkel,
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High Energy Physics
(ARG-10138)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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